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ABSTRACT

A cost-benefit study was conducted to determine the economic viability of continuing to offer training sessions for seafood processors through the College of the Mainland in Texas. Data for the study were collected from both primary and secondary sources, including the college and local company participating in the program, federal and state records and statistics, and direct observations. The cost-benefit analysis was based on estimates of direct costs (e.g., salaries, materials and supplies, advertising costs, and out-of-pocket operating costs); indirect costs, including the disruption of local employment patterns; direct benefits, including additional state sales tax generated from purchases via added income; and indirect benefits, such as the effect on the region of increased gross wages. The study revealed the cost-benefit ratio of the training sessions was 1.83, that is, for every dollar of state cost, $1.83 was returned to the state, largely through increased sales tax revenue. A sensitivity analysis, which assumed significant changes in costs, benefits, and discount rates, showed the project to be still marginally acceptable according to minimum cost-benefit criteria. The report includes a descriptive history of the Texas seafood harvesting and processing industries, which contains discussions on the influx of Vietnamese immigrants, price fluctuations and seasonality, and labor force needs, and statistics on wages and fishing regulations. (HB)

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A COST-BENEFIT ANALYSIS FOR SEAFOOD PROCESSING TRAINING SESSIONS IN THE GALVESTON BAY AREA

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for
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ABSTRACT

A cost-benefit analysis for state sponsored seafood processing training sessions in the Galveston Bay area was performed. Assessment of the direct and indirect costs and benefits involved indicated that for every dollar of cost, the state would generate $1.83 in benefits. Sensitivity analysis revealed that the results are not sensitive to reasonable changes in costs, benefits or time value.

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The author wishes to recognize and to thank the Texas Education Agency for its funding of this study. Other state and federal agencies that provided data and information are too numerous to list here, but their aid is appreciated.

No undertaking is an entirely singular one. Several individuals deserve separate mention. Dr. Joe Rubio, Associate Dean of Technical-Vocational Programs at College of the Mainland, first hinted at the prospect for such a study and skillfully guided the administrative processes as grant coordinator. Ms. Johnette Plantz, Coordinator of Continuing Education in the Division of Business at College of the Mainland, served well as institutional liaison. Mr. Arthur Hults of Seabrook Seafood patiently answered numerous questions concerning his enterprise. My colleague, Dr. Norman Weed, graciously reviewed segments of the analysis and provided his usual tempered wisdom. Any errors, of course, remain the author's responsibility.

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A BRIEF DESCRIPTIVE HISTORY

The Texas Seafood Industry

Seafood harvesting and processing is big business along the Texas Gulf Coast. Shrimp landings alone for the port of Galveston were 6.5 million pounds in 1980. There are 56 seafood processing plants along the coast of Texas. About 30 - 35 establishments do some form of seafood processing in the Galveston Bay area sometime during the year. The Galveston Bay shrimp fleet is comprised of about 900 vessels and it is these vessels which harvest the major portion of the seafood for commercial purposes in the Galveston Bay area. The individuals who partake of the occupation of "Shrimper" provide the human resource for this cyclical and somewhat peculiar local industry.

A Characteristic Shrimper

The fisherman was among the first of the harvesters as man has perennially taken from the sea. Through the ages, modern equipment has afforded few effective protections from the vicissitudes of nature. The modern fisherman is among those who, in diminishing number, continue to extract a harvest from a source fraught with uncertainty, change and natural hazard.

The local shrimper and commercial fisherman is a rugged and independent sort. He is as opinionated as he is competitive. Yet, acceptance of fate and suspicion of change are also among the characteristics of this individual. It is difficult to know what the annual income of a typical shrimper or commercial fisherman is. He works when he wants to and just about as long as he wants to. The changing moods of nature and the elusiveness of the catch along with the profligate tendencies of man combine to make the plight of the fisherman a continuing challenge.

The shrimper or commercial fisherman is clannish. The further back one's roots extend into the generations of the local seafood industry the more accepted one is. Newcomers, especially those of a different nationality, face social as well as economic barriers. The shrimper's outwardly easy manner can change suddenly to aggressiveness and even to violence if those

values which he holds dear are affronted. Since he knows quite well that his livelihood always lies in the sway, he tends to resist changes which he cannot see or control. Such resistance is especially fierce if the apparent change looks to impinge upon the tenuous economic conditions under which all fishermen live.

The Vietnamese Influx

The influx of Vietnamese fishermen to this part of the Texas Gulf Coast began around 1975 - 1976. At first the few Vietnamese who invested in shrimping vessels had little impact on the local industry. As a result, they were tolerated and even aided by shrimpers and others by way of teaching them some of the finer points of harvesting skills, Texas style. By 1979, the growth of Vietnamese captained vessels had become large enough to gain notice.

Sizeable communities of Vietnamese fishermen dot the Texas Gulf Coast now. Many have invested in vessels which now fish Galveston Bay. The Vietnamese are naturally industrious as well as thrifty. When the surprisingly meager harvests of 1979 occurred, the local shrimpers looked for reasons. Among them was the influx of the Vietnamese fisherman. Although logic does not support their reasoning, there was a noticeable increase in the number of Vietnamese fishing vessels which sent cries of overfishing the bay all the way to Austin. Politically the local fishermen tried, with some success, to limit the number of new commercial fishing licenses issued. The state agreed only to a two-year freeze on the issuance of licenses.

In the meantime, the industrious Vietnamese were fishing the bay as much as ever. The result of their increased activity created an unwanted change in the way of the local fisherman's routine. Allegations of illegal fishing and shrimping methods, night shrimping, improper netting and violations of unwritten fishing laws became more frequent and more vociferous. This activity culminated in some localized violence and some rather unwanted press coverage as well as a political approach to the problems.

The suggestion of initiating a training program to teach individuals how to process seafood was among the temporary solutions to the allocation of a growing number of potential fishermen. Presumably the idea was that perhaps new workers could be absorbed into the industry at the processing

instead of the harvesting level. At that point College of the Mainland entered the arena as a possible sponsor for the pilot project.

The processor chosen was Seabrook Seafood, Incorporated, in Seabrook, Texas. The pilot project was a welcome occurrence to the processor since it would help provide an already trained labor force to be called upon to meet the needs of a widely fluctuating demand for processing. Although the required skill level was not high, any amount of prior training would permit production efficiencies to occur. The original logic behind initiating the project as a political solution merely demonstrated a "Good Faith" attempt to deal with a difficult issue. The idea of keeping Vietnamese or any one else out of the shrimp boats and in the processing house just does not seem to have much factual truth behind it. Such a project could, however, provide some training support for processing more than the usual volume of seafood locally rather than sending it out of state to be processed.

Legal Dimensions of Seafood Harvesting

Enactment and enforcement of laws governing the methods of harvesting and processing seafood is done mostly through the Texas Department of Parks and Wildlife. Other laws and regulations come through the U. S. Department of Parks and Wildlife as well as from the legislature itself. Eighty percent of the shrimp in the U. S. comes from the Texas Gulf Coast. State law limits the size of the shrimp caught but not the overall poundage of the catch. The two-year moratorium on new licenses for shrimping vessels was a controversial one. Another bill which raised significant debate across the state and especially among commercial fishermen was the so-named "Redfish" bill. This piece of legislation prohibited commercial fishermen from harvesting the highly salable fish but allowed sport fishermen to continue their fishing.

The allegation that Galveston Bay is being overfished can be heard from almost every port along the coast. However, proof of that fact remains difficult if not impossible. The bay is apparently abundant in blue crab, meager in redfish and periodically deficient in shrimp. There are two varieties of shrimp, white and brown, and what is true of one as to relative abundance need not always be true of the other. It is easy and enticing to argue that overfishing of young shrimp will cause a significant shortage of mature shrimp. It is also true that the state's ability to control for

for overfishing is limited. The state has the authority to limit harvesting in particular areas, to set the length of the season for shrimping and to inspect vessels believed to be violating established laws. Even if this enforcement were perfect, which it is not, Texas authority ends at the border. Any other state may or may not be enforcing laws as well or better than Texas. A brief few excerpts of some laws germane to seafood harvesting are listed in Appendix B. The season for oyster harvesting is also closely determined. Additionally the Parks and Wildlife Department monitors the major oyster beds for signs of contamination and will list those affected by toxicants as off limits until the problem is corrected.

Most fishermen know the law, both written and unwritten. Most of the laws are followed most of the time. However, the ease and frequency with which those laws are violated seems to correspond with the degree of alleged violations on the part of other fishermen, especially the Vietnamese. The factualness of that rationalization need not be proved to justify illegal activity on the part of even the most honest fisherman.

Vessel type and size is another area for dispute and transgression. By law any vessel over five net tons must be registered with the state as a commercial fishing vessel. In reality there are ways of circumventing that requirement. The vessel can be outfitted to appear smaller than it actually is or the captain can merely plead ignorance of the law in the face of spotty enforcement. The size, number and placement of nets can also be modified to violate the written law. Finally, the technique of the harvesting can interfere with other vessels and cause loss of catch or even damage, which violates unwritten law.

Seafood Harvesting

The Bay Shrimp Fleet

For several years the bay shrimp fleet has numbered about 900 vessels with little fluctuation around that number. The National Marine Fisheries Service in Galveston, Texas, claims that the number of vessels has not changed much even in recent years. That assertion is in contrast to the allegations by local shrimpers of there being too many vessels in the bay.

All that is required to become a shrimper is a boat and license. Vessels are registered with the Department of Public Safety but a license count apparently does not accurately reflect the number of vessels shrimping since only those over five net tons of cargo capacity need be registered. An investment of $50,000 will finance a vessel suitable for bay shrimping. Local shrimpers bemoan the fact that unnaturalized citizens can own shrimp boats and that the Vietnamese, in particular, pool their wealth in order to purchase a vessel as opposed the singular ownership position of most domestic shrimpers. Essentially, the local shrimpers are looking for ways to limit entry into what is claimed to be their own domain.

The Impact of Seafood Harvesting

Seafood harvests from Galveston Bay alone contribute about $3 million to the Texas economy. Shrimp landings from all Gulf of Mexico vessels which use ports of Galveston Bay topped $15 million in 1980. Total output by the shrimping industry for the state of Texas was $63.9 in 1971. The overall economic impact, for any time period, is greater than these dollar amounts due to additional spending induced by the seafood industry activity. All of the above figures will be higher for 1982 due to the increased consumption demand for seafood nationwide. Also, the market values for crab, oysters and finfish of all variety and the production value added to them via processing must be added to the figures for the shrimp industry to gain an accurate picture of the impact of the seafood industry on the Texas economy. However, those estimates are not the focus of this study. The seafood industry in Texas is large and growing. As such it will command an ever larger economic role for the state even if confined to mostly coastal areas.

Price Fluctuations and Seasonality

The seafood industry is characterized by the seasonality of its product in much the same way that agriculture is. One major distinction is that preserving the product in fresh form is almost impossible for seafood products. Modern freezing methods have reduced this incapacity but not sufficiently to moderate prices for seafood products during "Off" season times. Seafood products which are not sold fresh or frozen are commonly canned or packaged into a variety of other seafood products. Most of this type of processing is done out of the state of Texas.

Other important factors also create significant variation in seafood product prices. The overall size of the catch per season has a measurable impact on the market price for that catch. Looking at Table 1, one can observe both an upward trend in prices and also a cyclical pattern which seems to be related to the volume of the shrimp catch. A potential explanation for the general upward movement in shrimp prices may be the influence of inflation. Much of the inflationary pressure may come from rising fuel costs.

One study completed in the early seventies indicates that, other things being equal, the size of the catch is a function of the effort extended by the shrimper. Here, effort is measured by the size of the vessel and its related equipment. The study deduced that variable costs rose with the size of the vessel but profitability did also. Hence, the conclusions were that vessels between 66 and 72 feet were the most profitable.[1]

Overall, the price fluctuations for seafood depend on several factors. First is the general abundance, or the lack, of the product. This factor is beyond the immediate control of the fisherman. Secondly, the seasonality of the product creates lower prices during the harvest and higher prices during the off season of the particular product. Thirdly, the number of

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[1]Warren, John P. et.al. Applying an Index of Fishing Effort to Estimate 1971 Costs and Returns for Gulf of Mexico Shrimp Vessels. (Galveston, Texas: Texas A & M University, 1974), pg. 10.

the fishermen and the extent of their effort are also related to the size of the harvest. Add to these the inherent problems of inflation, competition with sport and Mexican fishermen and increased coastal pollution and the position of the commercial fisherman can be seen as a tenuous one.

Table 1.

Shrimp Landings for Ports of Galveston Bay
(Heads On)

Year	Pounds	Value	Per Pound
1976	7,183,700	$14,147,729	$1.97
1977	6,783,800	$12,316,550	$1.81
1978	7,315,800	$15,179,479	$2.21
1979	4,506,000	$13,522,208	$3.00
1980	6,418,600	$15,507,985	$2.41

Source: Fisheries of the United States, 1980. April, 1981.

The Seafood Processing Industry

Number and Location of Processors

Any establishment that modifies the fresh seafood product can be classified as a processor. In that capacity there are many processors along the coast of Texas. However, the number of processing houses which process seafood mostly or exclusively number between fifty and sixty. The number fluctuates depending on the overall poundage of seafood product harvested. A processor will close his plant temporarily or for the season if sufficient product is not forthcoming to operate at a profit. Most of the large processors accept all of the major varieties of seafood (shrimp, crab, oyster and fish) and some accept only specific ones of those listed. Commonly, crab processing is the one to be excluded since it is very labor intensive and does not produce the desired dollar volume of product sales unless the processor has some capable pickers.

Most of the seafood processing houses are located in three regions of Texas. Those regions are the Brownsville-Aransas region, the Lavaca-Galveston region and the Beaumont-Port Arthur region. Vessels returning from Galveston Bay deliver their catch to processors in that region. Vessels returning from the Gulf will head for whatever port is most convenient for them. The Brownsville-Aransas area accepts and processes the majority of the shrimp delivered to Texas coast ports, followed closely by the Lavaca-Galveston region while the Beaumont-Port Arthur region does much less business.

Labor Force Needs

Even though modern technology has provided several useful devices for processing seafood, the predominant method is by the hand. Reasons for this are not difficult to come by. The mechanical processors tend to waste valuable product by weight, the measure for sales. The machines also tend to damage or injure the product at a higher rate than hand processing methods. Also, there are economic costs of operating the machines and maintaining them which may outweigh the benefits of their operation in comparison to using a semiskilled worker. The industry may be on the verge of a significant conversion to mechanical means of processing but that trend has not yet occurred on a grand scale along the southeast Texas coast.

The labor force demands for the seafood processing industry are as cyclical as its products. Table 2 indicates that the average employment for the season versus the year are significantly different. As deliveries of seafood peak, so does the demand for hand processing. This labor force demand fluctuation is actually a daily phenomenon. If there is little or no product arriving, then no processors are needed. If deliveries are greater than expected, then a backlog of product creates a high demand for processors. If processors in sufficient number cannot be located immediately, the processing house must ship the product out unprocessed and lose some potential profits as well as incur the storage and shipping costs.

The necessary skill level for processing plant workers is not high. However, pay rates are commonly based on the number of pounds or gallons produced by the worker each day. Workers are usually paid for their labor on the same day the work is completed. It is not unusual for workers to work only enough hours to earn the desired amount of pay for a given short term objective. This tendency along with the daily uncertainty of the labor force needs tends to invite the transient worker as opposed to the continual worker into the employ of the plant.

Table 2.

Texas Processing Plants and Average Employment

Year	No. of Plants	Average Employment	
		Season	Year
1975 - 1976	55	2,249	1,720
1976 - 1977	53	2,272	1,584
1978	60	2,404	1,733
1979	56	2,047	1,504

Source: Fisheries of the United States, 1980. April, 1981.

A Local Processing Plant

Seabrook Seafood, Incorporated, has been located in Seabrook, Texas, since 1959. It is a closely held corporation and is operated by Henry and Arthur Hults. It is very much like any other large processing plant along the Texas coast. Gross sales last year topped $4 million but sales

of twice that are ordinarily expected. The growth in demand for seafood products has stimulated new investment for the plant. The freezer capacity is to be doubled and new equipment of other variety is planned for introduction in the near future.

The expanded plant capacity will reduce the amount of seafood that has to be shipped off when sufficient processing labor is not available. The same storage increase will permit a greater volume of product to be accepted from suppliers. The suggestion of establishing a training program for seafood processors was met with cautious optimism at Seabrook Seafood. The results have been mixed but generally positive. The number of trainees for the program was fewer than hoped but the value of the effort may lie in the long-term rate of training and retention of processors.

THE COST-BENEFIT ANALYSIS FOR TRAINING SESSIONS

Rationalization of the Cost-Benefit Methodology

Assumptions and Limitations of the Study

The question posed in this study is whether or not it is economically justifiable to continue to offer seafood processing training sessions through the auspices of a state-supported community college. Up to this point in time, two prior training sessions were accomplished under a grant. Continuance of such a program must now be based on solid economic evidence of net positive social value.

In the process of answering the question posed, an assessment of costs and benefits both direct and indirect must be made. The focus will be from the state's vantage point since it provides the financial support for the sponsoring agent (College of the Mainland). The analysis will proceed along well-established lines of investigation for this type of question and deduce either that the question must be answered in the negative if costs exceed benefits or answered in the positive if benefits exceed costs. If the conclusion is positive, then the result will be tested for its sensitivity to changes in the substantive variables.

The applicable methodology for this study is cost-benefit analysis. The choice deserves some explanation as well as a discussion of the underlying assumptions. The methodology must fit the situation. There are two such techniques which are clearly applicable: the net present value and cost-benefit approaches. Ordinarily the net present value approach would be used when there is only one independent project to consider. However, since this project is state sponsored, it will be assumed that there exists a capital constraint. Essentially, this assumes the state will spend all of its revenue and that this project is vying for scarce funds on the margin. Secondly, it will be assumed that other alternative projects exist, at least in principle. These two assumptions are enough to justify the use of cost-benefit techniques. It remains to look at the assumptions underlying the technique itself before discussing the structure and results of the study.

The two major postulates which permit a monetary valuation of cost-benefit projects are: the social value of a project is the sum of the values of the project to the individual members of society and the value of a project to an individual is equal to his fully informed willingness to pay for the project.[2]

These two assumptions allow for assessment and additivity of the costs and benefits associated with a given project. Additionally and in order to accurately assess the area or regional multiplier effect of a given project's benefit stimulus the following assumptions must also be met: the public expenditure does not draw expenditures away from the private sector, the opportunity costs of the resources used are zero and the resulting products do not substitute for other products in the private market and, hence, do not result in private market unemployment.[3]

These three assumptions need to be discussed in view of the present study. As for the third, it can be relatively safely assumed that since the state expenditures will be drawn from general revenues and that the scope of the project is very limited that virtually no private market spending patterns will be influenced negatively. That is, the area or regional economic multiplier will not be diminished from what would otherwise be expected. The fourth assumption poses no problem for the study since most of the trainees come from an otherwise unemployed segment of the labor force. Finally, the fifth assumption can be met once it is known that the seafood consumption market is expanding rapidly and also that the institution of the training programs would merely alter the location and not the overall volume of seafood processed.

Cost-benefit analysis as a technique attempts to assess the dollar value of the direct and indirect benefits through time and to compare them to the dollar value of the direct and indirect costs through time of a given project in order to determine the worthiness of the potential undertaking. A project is acceptable if the ratio of the benefits to the costs is greater than or equal to one. In words, the dollar costs to society are compensated or more by the dollar benefits to society. The technique

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[2]Sassone, Peter G. and William Schaffer. Cost-Benefit Analysis: A Handbook (New York: Academic Press, 1978), pg. 44.

[3]Ibid., pg. 38.

is sensitive to the definitions of both costs and benefits. That is, incorrectly identifying either costs or benefits will tend to overstate or understate the resultant ratio. The technique is also sensitive to the inclusion or exclusion of the relevant costs and benefits germane to a particular project. Errors here will also overvalue or undervalue the resultant ratio. Incommensurables are those secondary costs and benefits created by the project but not easily accounted for. The two most common approaches to dealing with incommensurables is to include an estimate of their dollar impact on the project or, alternatively, to merely mention them as to the probable direction and magnitude of their impact. The second approach to incommensurables will be followed in this study. The final two areas of concern in utilizing the cost-benefit technique are the determination of the duration of the benefits and costs along with selection of the appropriate time rate of discount for determining present values. The usual manner of handling these problems and, with them, the accuracy of the costs and benefits is to perform sensitivity analysis. The sensitivity analysis performed in this study will be elementary in nature in that it will not incorporate probability techniques for determining the estimated range of selected values.

The scope of this study is limited in time, geography and economic impact. The time limitation acknowledges that the date are compiled from temporal phenomenon. For example, prices, costs and other conditions assessed during data compilation may or may not bear the same relation to one another through time as they did for this study. Similarly, the same relative conditions may or may not be true for different regions of the state or for other states. Finally, the assessed economic impact described by the study may not be reflective of similar industries or of other levels within the given industry. Essentially, these caveats acknowledge that the technique of cost-benefit analysis is not easily generalized beyond the parameters of the particular project.

Data Collection

The data were collected from both primary and secondary sources. The direct cost data for sponsoring and operating the seafood processing training sessions were attained from College of the Mainland and Seabrook Seafood. Assessment of the direct and indirect benefits was obtained from secondary sources, notably federal and state records and other academic studies.

Mr. Arthur Hults of Seabrook Seafood provided information on hourly and production pay scales, employee productivity and employee retention. The advertising, contact hour and training materials costs were provided by Ms. Johnette Plantz of College of the Mainland. When the need to estimate a particular cost figure arose, the values were arrived at in consultation with either of the above-mentioned individuals. It was determined that a minimum of two training sessions could be offered per year, and the data were prepared on that assumption.

The assessment of the out-of-pocket costs of supervision was made on the observation that no additional personnel beyond the trainer were needed to operate the training sessions. That is, no additional supervisory support was necessary to promote, arrange and complete the training sessions. Hence, these costs were deemed to be zero. Indirect cost assessment was also made by observation. It was noted that the potential trainees came from a portion of the labor market that might be described as transient or casual. Hence, these trainees tended to enter and exit the labor force on the basis of short term needs and did not affect other employment patterns. Therefore, the indirect costs of the training sessions were deemed to be zero also.

Data for the direct benefits came from secondary sources. The Texas state sales tax is currently 4%. However, the truly difficult question was what proportion of trainee income was probably spent on taxable items. This determination is important because increased revenues to the state were deemed to be the major benefit from the project, indeed the exclusive benefit. Information gleaned from the Bureau of Labor Statistics indicated that approximately 25% of trainee income spent on taxable items was a reasonable estimate.[4] Assessment of the indirect benefits was made through the aid of an academic publication which estimated the income and employment multipliers for the coastal region of Texas.[5] This figure was conservatively estimated to be two. That is, for every dollar spent in the form of increased trainee wages, an additional dollar of spending is generated by those ultimately receiving the initial dollars through the spending stream.

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[4] Handbook of Labor Statistics. (Washington, D. C.: U. S. Department of Labor, 1980), pg. 368.

[5] Jones, Lonnie L. et.al. Impact of Commercial Shrimp Landings on the Economy of Texas and Coastal Regions. (Galveston, Texas: Texas A & M University, 1974), pg. 10.

A variety of federal, state and local agencies were contacted in the process of collecting the data for this study. The data actually utilized possess at least one of the following characteristics: directly observed, verified by at least one other source, estimated by the person or entity capable of providing the most knowledgeable estimate. When more than one estimate or source for data was found, the estimate which was the most conservative and still reasonable one for the cost-benefit methodology was employed.

The Analysis and Results

The Cost-Benefit Ratio

Determination of the magnitude of the cost-benefit ratio will allow a judgement to be made concerning the net social value of the seafood training sessions. The mathematical expression for that determination is as follows:

$$B/C = \sum_{t=0}^{n} \frac{Bt}{(1+d)^t} \Big/ \sum_{t=0}^{n} \frac{Ct}{(1+d)^t}$$

The annual benefits are read from Table 3 as are the annual costs. The question of the relevant time period to be used to derive the present values of those respective flows was pragmatically determined. It takes about two years for the income multiplier to have its full impact on the regional economy. Hence, a two-year time period is incorporated. The time period is also reasonable given the nature of the project and the area economy. Since the analysis uses only discrete time periods, the costs are incurred at their actual magnitude during the first year while the dollar benefits continue into the second year and must be discounted.

The determination of the size of the discount rate is fraught with controversy. There are at least four conceptual rates from which to choose. They are the market rate, the marginal productivity rate, the corporate discount rate and the government borrowing rate. Without entering into a lengthy aside on which rate might be arguably the best suited for this analysis, suffice it to say that each category permits an array of possible rates and that there is no "ideal" rate. Hence, the solution will be to first pick a "reasonable" rate and then compare the results to those using

other rates. The initial or point estimate of the cost-benefit ratio for this project will assume a 12% rate of discount. This rate is above the government borrowing rate and below the current market rate at the time of this writing.

A glance at Table 4 indicates that the cost-benefit ratio is equal to 1.83. That is for every dollar of cost incurred by the state, a dollar and eighty-three cents in benefits is returned to the state. Based on this initial point estimate, the project is a worthy one. However, point estimates fail to provide an indication of the sensitivity of the results to changes in relevant variables.

Referencing Table 3, the dollar value of the annual benefits may appear to be overstated. Specifically, if the time period for the analysis is strictly two years, then the annual benefits should correctly be $3,244. This value is obtained by adding the one year discounted indirect benefits to the first year's direct benefits. However, if the training sessions operate on a continuing basis, then there is an argument for using the $3,428 figure since each year will reflect $1,714 in direct benefits and $1,714 in indirect benefits. Finally, there is the consideration of what might be labeled "Spin-Off" multiplier effects. These occur with each subsequent dollar of additional spending and are in addition to the central multiplier effect. The conclusion is that the use of the $3,428 figure is not conceptually inaccurate to any significant degree.

Appendix A contains the analysis for determining the gross wages for the trainees and an estimate of the proportion of total income spent on taxable items. The determination of gross wages paid is based on estimates of productivity and skill increases, employee retention and average number of days worked per season. These figures were provided by Seabrook Seafood and are subject to fluctuation. However, they are also relatively conservative in that they utilize values which would be expected and which have been observed on the average by the employers of Seabrook Seafood. The determination of the proportion of gross income spent on taxable items is also based on average tendencies as reflected by regional data. The choice of 25% as an acceptable figure is justified by collaboration from two independent sources, the Bureau of Labor Statistics and the Internal Revenue Service, along with the observation that it is the lower of the estimates found.

There exist those things which cannot be meaningfully measured by cost-benefit analysis. For the project in question such considerations are probably small. Yet, they should not be ignored. It is reasonable to expect some small redistribution effects of both production and consumption. In some small way the quality of life may be affected either positively (by improved dispositions of the workers or others) or negatively (by increased pollution emanating from the increased production of the plant). Overall, it is expected that these effects will not outweigh the assessed costs and benefits noted in the body of the study nor alter the positiveness of the cost-benefit ratio.

Table 3.

Cost-Benefit Dollar Estimates of State Supported Training Sessions for Seafood Processing Trainees

A. Costs	
1. Direct - TEA Contact Hour Funding $1.98/contact hour x 40 hours/trainee x 20 trainees/session x 2 sessions/year	$3,168
Breakdown of Direct Cost Application:	
a. Trainer Salary - $12/hour x 40 hours/session x 2 sessions =	960
b. Training Materials and Supplies - $50/trainee x 20 trainees/session x 2 sessions =	2,000
c. Institutional Advertising Costs - $104/session x 2 sessions =	208
d. Out of Pocket Operating Costs or Supervisory Costs Associated with the Training Sessions.	0
	3,168
2. Indirect - Disruption of Local Employment Patterns. (Most trainees are drawn from otherwise unemployed segments of the labor force).	0
Total Costs/Year	$3,168
B. Benefits	
1. Direct - Additional State Sales Taxes Generated from Purchases Via Additional Income. $171,380 gross wages x .25 proportion x .04 tax rate =	$1,714
2. Indirect - Income multiplier effect on the region from increased gross wages. The	

estimated multiplier = 2. Hence,	
the additional impact =	$1,714
(Any reduction in state payout for unemployment benefits, rent supplements or other state aid is assumed to be zero).	
Total Benefits/Year	$3,428

Sensitivity Analysis

A full demonstration of sensitivity analysis lies beyond the scope of this study. This is so mainly due to the nature of the seafood industry itself. The erratic pattern of product caught and resultant market prices make the assignment of probabilities of occurrence quite difficult. Also, the limited size of this particular project makes such finesses rather unnecessary. However, altering a few telling variables and noting the impact on the cost-benefit ratio does reveal something about the assurance with which one might recommend the project's undertaking.

Referring to Table 4, if the discount rate is raised to 20% (well above current market rates) the cost-benefit ratio falls to 1.65. If the dollar benefits are reduced by one fourth, keeping the discount rate at the original 12%, the cost-benefit ratio falls to 1.37. Similarly, if the dollar costs are increased by one fourth, keeping the discount rate at 12%, the cost-benefit ratio falls to 1.46. Then, allowing all three mitigating variations to occur at one time, the cost-benefit ratio falls to 0.99. This ratio indicates that the project is marginally acceptable. In other words, even if the estimates of costs and benefits were measurably in error and the time rate of discount soared to near its prior record level, the project would still be an acceptable one. The conclusions are not sensitive to reasonable changes in the costs, benefits or discount rate.

Table 4.

Cost-Benefit Ratio Analysis

A. The Basic Equation: $\frac{\text{Present Value of Benefits}}{\text{Present Value of Costs}}$

Annual Costs = $3,168

Annual Benefits = $3,428

Discount Rate = 12%

Time Period = 2 years

B. Results from the Basic Equation

Present Value of Costs = $3,168

Present Value of Benefits = $3,428 x 1.69 = $5,793

$\frac{\text{PV Benefits}}{\text{PV Costs}} = \frac{\$5,793}{\$3,168} = 1.83$

Interpretation: For every dollar of costs incurred by the state, $1.83 will be generated in benefits.

C. Sensitivity Analysis

1. Increase the discount rate to 20%:
   B/C = $5,237/$3,168 = 1.65

2. Reduce the dollar benefits by ⅛:
   B/C = $4,345/$3,168 = 1.37

3. Increase the dollar costs by ¼:
   B/C = $5,793/$3,960 = 1.46

4. Apply all three of the above changes to the analysis at once:
   B/C = $3,928/$3,960 = 0.99

Interpretation: The results are not sensitive to reasonable changes in the costs, benefits or discount rate.

SUMMARY AND CONCLUSIONS

This study began with a description of the seafood processing industry and the attending peculiarities of that industry. The research question addressed was whether or not it was economically justifiable to continue to offer training sessions for seafood processors through a state sponsored educational institution.

After a discussion of the relevant direct and indirect costs and benefits involved and the justification of using cost-benefit methodology, the question was answered in the positive. The initial cost-benefit ratio determined was 1.83. That is, for every one dollar of state cost, $1.83 was returned to the state mostly by way of increased sales tax revenue. This positive conclusion was then subjected to elementary sensitivity analysis which demonstrated that the same conclusion would have been reached even in the face of significant changes in relevant variables. Specifically, even if costs were 25% greater, benefits were 25% lower and the discount rate was 20%, the project would still be marginally acceptable according to the minimum cost-benefit criterion.

The scope of this study should not be generalized beyond the plant and region described. To do so would run the significant risk of erroneous conclusions therefrom. Given the small scale and limited scope of the project many assumptions were able to be easily met. The same would not be necessarily true for projects of a grander scale. It is also recommended that if the findings of this study are of significant interest to the state, that replications of it be undertaken before significant amounts of funding are allocated to such training programs. At least two serious questions must be addressed before a large scale program for seafood processing training should commence. The first is just how large the industry is and how fast it is growing. The second is whether or not similar programs along the Texas coast would produce positive results as this one did. Without answers to these questions, the conclusions only warrant the continuance of state sponsored seafood processing training sessions through the vendor studied here.

BIBLIOGRAPHY

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A Guide to Texas Commercial Fishing Regulations. Austin, Texas: Texas Parks and Wildlife Department, July, 1980.

Baumol, William J. Economic Theory and Operations Analysis. 4th Ed. Englewood Cliffs: Prentice-Hall, 1977.

Bullock, Bob. 1980 Annual Financial Report, State of Texas, Fiscal Year Ended August 31, 1980.

Child Labor Law. Austin, Texas: Texas Department of Labor Standards, March, 1979.

Farley, O. H. Personal Interview. Galveston, Texas, August, 1981.

Handbook of Labor Statistics. Washington, D. C. : U. S. Department of Labor. 1980.

Hofstetter, Robert P. Oysters in Texas. Austin, Texas: Texas Parks and Wildlife Department, September, 1976.

Hults, Arthur. Personal Interview. Seabrook, Texas, various dates.

Jones, Lonnie L. et. al. Impact of Commercial Shrimp Landings on the Economy of Texas and Coastal Regions. Galveston, Texas: Texas A & M University, December, 1974.

Kerber, Bill. Personal Interview. Seabrook, Texas, February 3, 1982.

Reynolds, Don. Personal Interview. Seabrook, Texas, April 29, 1981.

Sassone, Peter G. and William A. Schaffer. Cost-Benefit Analysis: A Handbook. New York: Academic Press, 1978.

Semi-Monthly Pay Day Law. Austin, Texas: Texas Department of Labor Standards, March, 1979.

Steven, Jim. The Spotted Seatrout in Texas. Austin, Texas: Texas Parks and Wildlife Department, September, 1976.

Texas Crab Rules and Regulations. Austin, Texas: Texas State Department of Health, June, 1969.

Texas Food, Drug and Cosmetic Act. Austin, Texas: Texas State Department of Health, March 6, 1974.

Texas Seafood Symposium: A Summary Report. Galveston, Texas: Texas A & M University, 1973.

Texas Shellfish Rules and Regulations. Austin, Texas: Texas State Department of Health.

Texas Sportfishing Guide, 1981-1982. Austin, Texas: Texas Parks and Wildlife Department, June, 1981.

Thompson, B. G. Fisheries of the United States, 1980. Washington, D. C.: U. S. Department of Commerce, April, 1981.

Valentino, Johnny. Personal Interview. Eagle Point, Texas, August 28, 1981.

Warren, John P. et.al. Applying an Index of Fishing Effort to Estimate 1971 Costs and Returns for Gulf of Mexico Shrimp Vessels. Galveston, Texas: Texas A & M University, February, 1974.

APPENDIX A

Determination of Gross Wages and the Proportion Spent on Taxable Items

A. Determination of the Proportion of Gross Income Spent on Items Subject to State Sales Tax

1. Department of Labor Statistics data for 1972-1973 for a family of three indicates:

   $2,180 spent on taxable items/$7,486 gross income = 29%.

2. Department of Labor Statistics data for 1972-1973 for the southern region of the U. S. indicates:

   $2,620 spent on taxable items/$10,348 gross income = 25%.

3. 1982 Internal Revenue Service 1040 form instruction booklet sales tax tables for a family of three earning $11,000 annually indicates that 25% of their income is spent on taxable items.

B. Computation of Gross Wages for Trainees

1. During the training session:

   20 trainees/session x 40 hours x $3.50/hour x 2 sessions = $ 5,600

2. For the two weeks following the training session:

   *a. oysters: 8 gals./day x 10 days x $6/gal. x 20 trainees = 9,600
   *b. shrimp: 480 lbs./day x 10 days x $.07/lb. x 20 trainees= 6,720
   +c. fish: (200 lbs./day) x 8 days x $28/day x 20 trainees x 2 sessions = 8,960

#3. For the remainder of each season

   a. oysters: 20 gals./day x 100 days x $6/gal. x 5 trainees = 60,000
   b. shrimp: 1400lbs./day x 150 days x $.08/lb. x 5 trainees = 73,500
   c. fish: (800 lbs./day) x 50 days x $28/day x 5 trainees = 7,000

   $171,380

*Oyster season will follow one training session and shrimp season will follow the other training session.

+Fish processing can continue year around and the pay is a flat rate of $3.50 an hour.

#The figures are estimates of production rates, days worked, pay rates and the number of trainees still working two weeks following the training session, respectively.

APPENDIX B

Selected Texas Commercial Fishing Regulations

I. Shrimp

A. Seasons

1. Bait shrimping season - "Inside Waters" open throughout the year except from sunset to sunrise during the "Fall Open Season."

2. Spring open season - "Major Bays" open May 15 through July 15, days only from 30 minutes before sunrise to 30 minutes after sunset.

3. Fall open season - "Major Bays" open August 15 through December 15, days only from 30 minutes before sunrise to 30 minutes after sunset.

B. Size

For shrimp taken from "Major Bays," during August 15 through October 31, legal shrimp count 50 heads-on per pound; shrimp taken during November 1 through December 15 are not required to meet count requirements. Shrimp taken during the "Spring Open Season," shrimp taken for bait, shrimp graded and landed and seabobs are not required to meet count requirements.

C. Inside Waters and Commercial Bay Shrimp Boats

1. Legal means of taking, "Spring Open Season" - only one main net and one try net may be used. The try net may not exceed 21 feet in total width and the doors or boards may not exceed 450 inches each. A beam trawl used as a try net may not exceed 10 feet in width. If an otter trawl is used as a main net, it must have doors at least three feet long as measured along the door centerline from leading tip to the trailing edge of the door excluding any add-on devices of any type, or not to exceed any of the following dimensions, as measured along an uninterupted corkline from leading tip of door to leading tip of door: (list of measurement requirements).

2. Legal means of taking, "Fall Open Season" - only one otter trawl and one try net may be used. The total width of the otter trawl and doors may not exceed 95 feet. The try net may not exceed 21 feet in total width and the doors or boards may not exceed 450 square inches each. Trawls must have a mesh size of not less than eight and three-fourths inches in length between the two most widely separated knots in any consecutive series of five stretched meshes. A beam trawl used as a try net may not exceed 10 feet in total width.

II. Oysters

A. Commercial oystering seasons - November 1 through April 30 except in that part of the Laguna Madre South of the Port Mansfield Channel and all private leases with permits from the Texas Parks and Wildlife Department where there is no closed season. During open season, oysters may be taken only from sunrise to sunset.

B. Legal size limits - Three (3) inches (greatest length of shell) or larger. Oysters three-fourths inch to three inches are to be culled and returned to reef from which taken. Provided, however that each cargo may contain not more than five percent of oysters of this size. Not more than one bushel of unculled oysters is permitted on board while fishing on a reef.

C. Legal means and methods - One oyster dredge not more than 36 inches in width across the mouth and of not more than two bushel capacity may be used or possessed on board any boat in public waters. Commercial boats limited to not more than 50 barrels of legal size oysters.

III. Crabs

General Regulations - It is unlawful to take egg bearing female crabs (sponge crabs). All other crabs may be taken in any number at any time and by any method except as restricted under special regulations.

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